

These figures show very plainly that the differences of the results with regard to the height are essentially a consequence of errors of measurement, and that the thickness of the cloud-layer itself was very small, perhaps only the fraction of a kilometre. With this agrees the almost exactly similar aspect of the phenomenon at the two places of observation.

Figs. 1 and 2 represent the phenomenon as it appeared on July 2, 1889. The photograph reproduced in Fig. 1 was taken in Steglitz at 13h. 21m. os., Berlin mean time, and Fig. 2 simultaneously at Nauen. It is interesting to observe the parallactic shifting of the same cloud-points, in the two illustrations, in a fixed direction. In each of the illustrations, two stars, α and β Aurigæ, appear. On account of the enormous distance, the lines of direction, in which one and the same star is seen simultaneously from different points of view, are parallel to one another.

Hence the deviation of two corresponding cloud-points, in the illustrations, with regard to one and the same star, gives a measure for the parallax of those cloud-points, on the supposition that the focal distance of the photographic apparatus is known. The focal distance of the two sets of apparatus was precisely determined by the photographing of stars, and proved to be almost exactly 200 mm. In accordance with this the above-mentioned height of 81 kilometres was found.

The following peculiarities, which observation of luminous clouds has firmly established, are of great interest:—

(1) Luminous clouds had in general a very rapid movement from north-east to south-west. In some cases movements also took place in the opposite direction; but these were always much slower—and they were also much less frequent—than those first named.

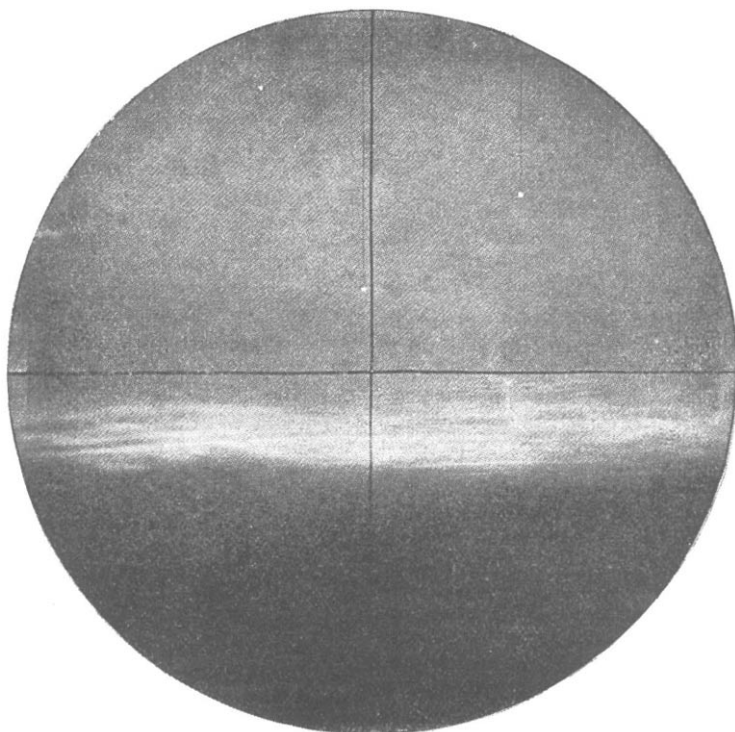


FIG. 2.

(2) Since their first appearance, luminous clouds have to a considerable extent waned. In the year 1890 they have displayed a beautiful brilliance during only about three nights; at other times the light was for the most part very feeble. Very probably we must connect with this decrease of light the fact that the apparent height at which the clouds have been seen, has been very much smaller in the last years than it was formerly.

(3) Luminous clouds present themselves generally much

more brightly—therefore are more frequently visible—after than before midnight. While in the first years they appeared before midnight very frequently, they have done so in the last years very seldom. After midnight they still appear pretty often. Whether this distinction existed during the first years, was unfortunately not established, because the regular observations were then usually limited to the time before midnight.

O. JESSE.

NOTES.

THE anniversary meeting of the Royal Society will this year be held on Monday, December 1, St. Andrew's Day falling on a Sunday. The medals are to be given as follows:—The Copley Medal to Prof. Simon Newcomb, for his contributions to gravitational astronomy; the Rumford Medal to Prof. Heinrich Hertz, for his work in electro-magnetic radiation; a Royal Medal to

Prof. David Ferrier, for his researches on the localization of cerebral functions; and a Royal Medal to Dr. John Hopkinson, for his researches in magnetism and electricity; the Davy Medal to Prof. Emil Fischer, for his discoveries in organic chemistry; and the first Darwin Medal to Mr. A. R. Wallace, for his independent origination of the theory of the origin of species by natural selection. The anniversary dinner will take place at the Hôtel Métropole.

LORD RAYLEIGH has been appointed an honorary member of the Bavarian Royal Academy of Science.

PROF. J. A. EWING, F.R.S., has been elected Professor of Mechanism and Applied Mathematics at Cambridge, in succession to Prof. Stuart.

MR. WILLIAM LEADBETTER CALDERWOOD, who was for several years naturalist to the Fishery Board for Scotland, has been appointed Director of the Laboratory for Marine Zoology at Plymouth.

SOME time ago the Phi Beta Kappa Society proposed that the four hundredth anniversary of the discovery of America should be signalized by a memorial history of American literature and science. Two prizes of 3000 dollars each were to be offered for the best general survey of American literature and science respectively; and, in addition to this, it was proposed that the preparation of an extensive and detailed account of scientific achievement should be prepared, the work for each department being entrusted to a specialist in that department. The New York *Nation*, which calls attention to the matter, speaks of this last undertaking as "the really serious task, and the only part of the scheme which possessed in a high degree the monumental character." We learn from the *Nation* that a committee having the project in charge is about to meet and confer upon the initiation of the work. The committee consists of the presidents of six of the most important American Universities, together with one or two other gentlemen of equal eminence.

IN the *Kew Bulletin* for November many interesting facts with regard to the cultivation of Liberian coffee are brought together. The same number contains an excellent account of the cola nut (*Cola acuminata*, R. Br.). In early times, cola nuts were supposed to be used merely as a means for rendering water sweet and palatable when drunk before or after meals. "But," says the *Bulletin*, "it was soon evident that they possessed other properties, and that they had been selected as if by intuition on account of the property which undoubtedly they did possess of supplying a necessary stimulus to those who have to endure an occasional or prolonged deficiency of animal food; for in West Africa, as in other parts of the tropics, the flesh of animals is often scarce and difficult to procure. The use of cola nuts to render water palatable may be compared to that of olives in European countries. The latter are well known to enhance the flavour of whatever is eaten after them. On the other hand, the power said to be possessed by cola nuts of staying the cravings of hunger, and of enabling those who eat them to endure prolonged labour without fatigue, is comparable to that ascribed to the leaves of the coca plant of Ecuador and Peru. In fact, cola nuts in Western Africa play the same part that *Erythroxylon Coca* does in South America."

ON Monday, the Master (Sir James Whitehead), the Wardens and Court of the Fruiterers' Company, and others, had an interview with the Lord Mayor at the Mansion House, to seek his aid in a project for the encouragement of the culture of British fruit. Sir James Whitehead, addressing the Lord Mayor, said that, having regard to the great success which had attended the recent exhibition of fruit at Guildhall, the Fruiterers' Company were now proposing to increase their operations in the same direction. Their idea was to have fruit shows in different parts of the country, similar to the annual shows of the Royal Agricultural Society of England, in co-operation with the local horticultural societies. During these shows there would be lectures on various subjects connected with the cultivation of fruit. It would be the aim of the Company to give the warmest encouragement to the various horticultural societies, and to stir up a spirit of emulation among the local and parochial organizations. The Company had arranged that the committee of ex-

perts who recently assisted them in connection with the Guildhall exhibition should meet once a month, and receive and answer questions on the subject of fruit culture. It was estimated that to carry out these objects a fund of about £20,000 would be necessary. It was believed that landed proprietors and the City Companies would be willing to aid this effort, and they might even obtain the assistance of a Government grant. What they asked the Lord Mayor to do was, first, to allow a great public meeting to be held at the Mansion House, and, secondly, to organize a Mansion House fund with the view of raising the necessary sum. The Lord Mayor cordially agreed to convene and preside over such a meeting as was suggested, but reserved his decision as to the raising of a Mansion House fund.

MR. SHIRLEY HIBBERD, the well-known horticulturist, died at his residence at Kew on Sunday. He was for many years editor of the *Gardener's Magazine*, and was the author of many works on horticulture. Mr. Hibberd was in his sixty-sixth year.

ON Saturday evening several shocks of earthquake were felt in the north-east of Scotland. The *Daily News* says that the first shock was experienced at 5.50 p.m. in Inverness, and that it lasted about 30 seconds. A good deal of damage was done to property by the falling of gables, chimneys, &c. The inhabitants were very much excited. Half an hour afterwards a second shock was experienced, but was not of so severe a character. About 6 o'clock a sharp shock of earthquake was felt at Forres. The disturbance was accompanied by a rumbling noise, with heaving and convulsion, which lasted from 15 to 20 seconds. It was felt over a radius of several miles. The *Times* says the earthquake was felt at Beaulieu, Inverness-shire, where many shops and houses were severely shaken, and furniture was thrown down. In Western Lovat a chimney-stack was knocked over. We learn from a correspondent at Nairn that "a slight vibration" was felt there and in the surrounding district "about 6 p.m."

AT the fourth annual general meeting of the Anthropological Society of Bombay, an address was delivered by the retiring President, Mr. Denzil Ibbetson. Speaking of the valuable contributions that might be made to anthropology by native inquirers, Mr. Ibbetson pointed out that sources of information are freely opened to them to which Englishmen can gain access only with difficulty. "It is through their agency alone," he said, "that we can hope to learn the rites and customs particular to women, rites and customs which I believe to possess a very special significance, as being in many cases handed down directly from the aboriginal women of the country, with whom the subsequent immigrants intermarried. And their facilities of communication with the masses are so infinitely greater than our own, that I look forward to the most valuable results so soon as we have a body of native gentlemen intelligently studying the anthropology of India. At present, in Upper India at any rate, a native who is sufficiently educated to understand the nature and object of our inquiries is too often hampered by his religious education, which causes him to describe the religion of the peasantry as it should be rather than as it is, and by his pride of caste, which prevents him from interesting himself in those whom he considers beneath his notice."

A PASSAGE in an appendix to Mr. Scott's last report on the administration of the Northern Shan States shows the extraordinary mixture of peoples and tongues in this region, and shows also what a task there is for the ethnologist of the future to unravel the tangled skein presented to him by the Shan State of Mainglin. The report says the population consists of Shans, Las, Was, Kachins, Shan-Taloks, Myen, and a tribe known as Muṭso. The Las men dress like Shans, but their clothes are of black or

dark-blue stuff. The women wear black coats and black *tameins*. The Was, both men and women, wear black coats and a striped black and white *lungi*. The Myen wear clothes like Shans, but black, and are said to shave the head, leaving only a pigtail like the Chinese. They are represented as speaking the same dialect as the Chinese Shans. The Mutso tribe is so called by the Shans from their being hunters. They, like the Las and Was, have a separate language, but in every tribe there are a good many men who understand Shan. The Myen tribe are said to be *nat*, or spirit, worshippers, but among the Las and Was there are a good many Buddhists.

IN the September number of the *Bulletin of the Italian Geographical Society*, Colonel C. Airaghi gives an account of an exploration in Dembelas, a region of the plateau of Northern Abyssinia, watered by the River Mareb. The memoir deals with the topography, geology, and natural history of the district, with the aid of diagrams. Considering the proximity to the equator, the climate is very mild, though the changes of temperature are often rapid. A general map, and the notes of his fellow-explorer, Captain St. Hidalgo, will appear in the next issue. The most important paper is Dr. Arthur Wolynski's on the population of the Caucasus. This is estimated at 6,171,400, of whom 1,217,400 are Mongols, mainly Tartars. Of the whites 1,854,000 belong to the native Caucasian races—these are classified carefully; 41,000 are Semites, mostly Jews; the remaining 3,059,000 are Aryans, almost all groups being represented. The Russians number nearly two millions, while Dr. Wolynski estimates the Armenians at 750,000, and the Persian group at 339,000.

THE Meteorological Sub-Committee of the Croydon Microscopical and Natural History Club is doing good work by collecting and publishing daily rainfall values at a number of stations in the counties of Kent and Surrey, together with brief general notes on the weather of each month. The Report for 1889 shows that the year began with a staff of thirty-eight observers, superintending forty-five stations.

IN the *Meteorologische Zeitschrift* for October, M. Nils Ekholm gives an account of a method on trial at the Meteorological Office of Stockholm, which seems likely to throw some light upon what has hitherto been a difficult matter to deal with, namely, the determination of the path taken by storms. He calculates, from the telegraphic weather reports, tables of the density of the atmosphere, and constructs from the data synoptic charts of this element, and finds that they give a better clue to the movements and origin of cyclones than the usual method of a comparison of the isobars and isotherms alone. He finds that storms move in the direction of the warmest and dampest air, parallel to the lines of equal density, leaving the rarer air to the right-hand. A few empirical rules are quoted from about a hundred cases which have been investigated.

MR. T. TUHLIN has recently published in the *Nova Acta* of the Royal Society of Sciences of Upsala, a paper on the nocturnal temperature of the air at different heights up to 24 feet, from hourly observations taken during the winters of 1887 and 1888, in the grounds of the Upsala Observatory. The observations were made mostly while snow lay upon the ground, both with thermometers with and without screens, and were intended to form a sequel to the series made by Mr. H. E. Hamberg during the summer season. The first part of the paper contains a *résumé* of the experiments made since 1778. The following are some of the chief results arrived at in the second part of the paper. The decrease of temperature by radiation from unprotected thermometers over snow remained almost constant at heights above half a metre. During clear nights the temperature increased with height, from two or three hours before sunset until two hours after sunrise, and the lower the temperature,

the greater was the increase. During cloudy or foggy nights the temperatures at different heights were nearly equal; but if the clouds were high and thin, the increase of temperature with height was only slightly hindered. The surface of the snow was found to be colder than the surrounding air.

A CORRESPONDENT of *Die Natur* describes the following incident, which he himself observed. On the branch of a tree was a sparrow's nest, in which were some young sparrows, and not far off sat the mother. A male sparrow, coming along that way, was attracted by her, and began to make advances, which were steadily rejected. By and by he rested on a neighbouring branch, and the mother flew away in search of food for her young. No sooner had she departed than the disappointed suitor pounced down upon the nest, caught one of the young sparrows in his bill, went off with it a little way, and then dropped it, apparently rejoicing in its death.

PROF. F. W. PUTNAM lately brought under the notice of the Boston Society of Natural History some fresh evidence of the fact that man was in America contemporaneous with the mastodon and mammoth. This evidence is afforded by a rude figure unquestionably representing a mammoth, scratched on a portion of a Busycon shell found under peat in Clairmont County, Delaware. Around the shell were human bones, charcoal, bones of animals, and stone implements.

ALTHOUGH the adult crab-eater, cobia, ling, or coal-fish (*Elacate Canada*), as the species is variously designated, is well known, the young has escaped notice until recently. In August, 1887, Dr. T. H. Bean caught two specimens in Great Egg Harbour Bay, New Jersey; and these he has described in a Bulletin of the U.S. Fish Commission. Dr. A. K. Fisher, in some notes he has just contributed to the Proceedings of the U.S. National Museum, mentions that, in June 1876, he received a young fish of this species, measuring 95 mm. in length, from a fisherman who caught it in a minnow seine about a mile north of the village Sing Sing, New York, in the broad and shallow cove formed by the expansion of the Croton River as it enters the Hudson. Nothing could be learned of the habits of the young fish except that it was alone. This was true also of Dr. Bean's specimens; "so, presumably, the young must soon separate and lead a solitary life, as the adults are said to do." The subject is of some practical interest, because the crab-eater, in Dr. Fisher's opinion, is "entitled to prominence as a food-fish, not only on account of the delicate flavour of its flesh, but also for its suitable size."

Apropos of our notes on scientific guide-books for Switzerland, Messrs. Wesley and Son send us from their catalogue the titles of the following works:—"Tourist's Guide to the Flora of the Alps," by K. W. v. Dalla-Torre, translated by Bennett, 1886, 4s. 6d. "Tour of Mont Blanc and of Monte Rosa," by J. D. Forbes, 320 pp. text, with engravings and maps, Edinburgh, 1855, 6s. 6d. "Flore Analytique de la Suisse," by A. Gremli, Genève, 1885, 7s; also in English, 1889, 7s. 6d. "Flora der Schweiz," by J. Hegetschweiler, edited by Heer, with 8 plates, Zürich, 1840, 4s. "Sketches of Nature in the Alps," by F. v. Tschudi, 1856, 2s. 6d. (Contents: General Characteristics; Vegetable Life; Hunting of the Vulture, Chamois, Lynx, Fox, Wolf, Bear, Alpine Cattle, Glaciers, &c.). "The Tourist's Flora: a Descriptive Catalogue of the Flowering Plants and Ferns of the British Islands, France, Germany, Switzerland, Italy, and the Italian Islands," by J. Woods, with index, 586 pp. and plate, 1850, £2 15s.

A SECOND edition of Mr. Frederick E. Chapin's "Mountaineering in Colorado" (Sampson Low) has been published.

There are some most interesting illustrations in this book. With few exceptions, they have been made directly from negatives taken during the author's various expeditions. The reproductions are the work of the Boston Photogravure Company.

WE have received from the publishers, Messrs. Macmillan and Co., a small book of "Illustrations and Diagrams" from the works of Dr. Geikie and others, that has been arranged by Mr. Cecil Carus-Wilson to illustrate, in the Oxford University Extension lectures, the geological courses delivered by him. In order to give elementary lectures on this subject to students, one must have a most liberal supply of diagrams, &c., and they must all be placed so that they may be conveniently seen. Again, when slides are used students have not time to copy them while on the screen, and in this way many important facts which could be remembered by the presence of a diagram are forgotten. By means of Mr. Carus-Wilson's hand-book these disadvantages will disappear, and the student will have good and trustworthy illustrations from which he will be able to draw more comprehensive and accurate conclusions than he could from his own rough sketches made at the time. The diagrams are printed on excellent paper, and at the foot of each is a short description, with the reference to the work from which it has been taken. The book is sold at cost price.

THE Indian Press, Allahabad, has published a very good series of geographical text-books for Indian schools, by the late Prof. S. A. Hill, of Muir Central College, Allahabad. The series consists of three little volumes, the first two of which have reached a third edition. The third volume, which is new, treats chiefly of mathematical and physical geography.

THE fifth edition of Prof. M. Foster's "Text-book of Physiology" (Macmillan) is being published. Part iii., which has just been issued, deals with the central nervous system. The work has been largely revised.

MESSRS. LONGMANS AND CO. are issuing the tenth edition of Quain's "Elements of Anatomy." The task of editing the work has been entrusted to Prof. E. A. Schäfer and Prof. G. D. Thane. We have received the first part of vol. i., and the first part of vol. ii. The former deals with embryology, and is edited by Prof. Schäfer; the latter with osteology, Prof. Thane being the editor.

THE second edition of "The Fuel of the Sun," by W. Mattieu Williams, has been issued. As the work was originally published twenty years ago, the author contributes a preface to the new edition, giving "a brief outline summary of the bearings of the growth of knowledge upon the subjects of the several chapters."

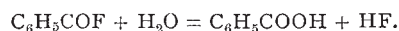
MESSRS. BAILLIÈRE, TINDALL, AND COX will publish in a few days an octavo volume (360 pages and 52 figures) entitled, "Researches on Micro-Organisms," by Dr. A. B. Griffiths. The work gives an account of recent researches in various branches of bacteriology.

THE Naturalists' Publishing Company, Birmingham, have issued "The Naturalists' Annual and Directory for 1891," edited by the editor of the *Naturalists' Gazette*. It consists of a number of short scientific articles, by various writers, and a directory indicating "the Lepidoptera of the months."

THE University College of Nottingham has published the Calendar for its tenth session. In a supplement the facts relating to the engineering department of the College are brought together.

BENZOYL FLUORIDE, C_6H_5COF , has been prepared for the first time by M. Guenez in the laboratory of M. Moissan at the Parisian École de Pharmacie. It was obtained by the general reaction lately proposed by M. Moissan, heating silver fluoride

with the corresponding chloride in a sealed tube. Equal molecular proportions of silver fluoride, AgF , and benzoyl chloride, C_6H_5COCl , were heated together for six hours in a sealed tube to a temperature of 190° . After allowing the tube and contents to cool, the drawn out sealed end was opened at the blow-pipe in order to permit of the escape of gaseous silicon tetrafluoride, which is formed in considerable quantity owing to the energetic action of benzoyl fluoride upon glass. The tube was then drawn out about the middle of its length, and bent over in a V shape; the benzoyl fluoride was thus readily distilled off from the residual silver chloride, the second limb of the V acting as a condensing tube. The product so obtained was found, as might be expected, to contain admixed benzoyl chloride. It was therefore reheated in a second sealed tube with a fresh quantity of fluoride of silver, and the product distilled in the same manner as before. The resulting benzoyl fluoride was found to be practically free from chloride. Benzoyl fluoride is a colourless liquid possessing an odour analogous to that of benzoyl chloride, but much more irritating, the least trace of its vapour producing a copious flow of tears. It boils at 145° , and readily ignites when heated in the air, burning with a flame bordered by a blue halo. It sinks in water, which liquid slowly decomposes it in the cold, with formation of hydrofluoric and benzoic acids—



In contact with solutions of caustic alkalies it is rapidly converted into fluoride and benzoate of the alkali, the reaction being almost instantaneous when the temperature is slightly raised. It attacks glass very vigorously, with liberation of gaseous silicon tetrafluoride; benzoic anhydride, containing a deposit of potassium fluoride, is found remaining in the corroded vessel.



Benzoyl fluoride appears, therefore, to fulfil the expectations concerning it in resembling very closely its nearest analogue, benzoyl chloride, in properties, the differences being only those due to the more active nature of the halogen fluorine, and to the remarkable affinity of the latter element for silicon.

THE additions to the Zoological Society's Gardens during the past week include an Indian Chevrotain (*Tragulus meminna* ♂) from India, presented by Mr. Greenberg; a Globose Curassow (*Crax globicera* ♂) from Mexico, presented by Mr. R. M. Pryor, F.Z.S.; two Long-eared Owls (*Asio otus*), British, presented by Mrs. Twickline; an Eyed Lizard (*Lacerta ocellata*, var.) from Southern Spain, presented by Mr. Francis Napier; a Black-headed Gull (*Larus ridibundus*), British, presented by Miss Lanze; an Alligator (*Alligator mississippiensis*) from Florida, presented by Mr. C. J. Owen; a Cryptoprocta (*Cryptoprocta ferox*) from Madagascar, purchased; two Crested Porcupines (*Hystrix cristata*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE DUPLICITY OF α LYRÆ.—At the meeting of the Royal Astronomical Society on November 14, Mr. A. Fowler exhibited some photographs of the spectrum of α Lyræ which indicate that it is a spectroscopic double of the β Aurigæ and ζ Ursæ Majoris type. The photographs were taken with the 10-inch refractor belonging to the Royal College of Science, with two prisms of $7\frac{1}{2}^\circ$ each in front of the object-glass, and form part of a photographic study of stellar spectra recently commenced at Kensington by Prof. Lockyer with a special object. The evidence of duplicity of this kind of binary star depends upon the fact that when the two components are moving in opposite directions in the line of sight, the lines that are common in their spectra are displaced towards opposite ends of the spectrum, in accordance with Doppler's principle, and therefore appear double. When the motion is at right angles to the line of sight, there is, of course, no such displacement,